SYSTEM profile

Under the Microscope

The New Jersey Department of Environmental Protection gives its undivided attention to a drip irrigation system with pretreatment

By Scottie Dayton

An 85-year-old woman wished to close the sale of her modest, three-bedroom home in Lawrenceville, N.J. An inspection of the house, built in the early 1940s, revealed that the septic system – a tank, distribution box, and one 25-foot lateral – was backing up. Living alone and using little water, the owner was unaware of the situation.

"The sewage was probably surfacing in her backyard, but the grade continues away from the house into the woods, so she'd never noticed," says Jason Fichter, P.E., P.P., of InSite Engineering, LLC, in Ocean, N.J.

Fichter dug six test pits and each one came up "horrible clay and lots of fractured shale with clay stuffed in the fractures." To test the soil percolation, he dug a 6-foot-deep by 50-square-foot hole and filled it with 375 gallons of water. After 24 hours, it hadn't budged. "Our previous test pits revealed mottling, but no seepage," says Fichter. "The clay and shale were obviously preventing the water from moving."

Fichter figured that a standard mound system would fail before long and would be unsightly. New Jersey is just starting to support alternative treatment systems, leaving Fichter uncertain of the best permissible solution under state and local codes. He discussed the site conditions with other engineers and the state Department of Environmental Protection (DEP) before developing a six-zone design employing drip irrigation with pretreatment.

Site conditions

Soils are clay and shale with little or no percolation and mottling to 24 inches. A carriage house on the wooded 200-by-330-foot lot is tied into the system. An apple orchard abuts the west portion of the property, which has a moderate slope.

Supply manifolds for the new system in Lawrenceville, N.J.

System Profile

Location:	Lawrenceville, N.J.
Facility served:	Main house and carriage house
Installer:	Central Jersey Septic, Old Bridge, N.J.
Site conditions:	Clay and shale with little to no percolation.
Type of system:	Recirculating textile filter from Orenco Systems Inc., Sutherlin, Ore.; drip irrigation from Geoflow, Inc., Corte Madera, Calif.
Hydraulic capacity:	850 gpd

System components

Fichter designed the system to handle 850 gpd. The major components are:

- Preformed concrete 1,000-gallon septic tank, 1,350-gallon septic tank, 1,500-gallon dosing tank, and 2,000-gallon, two-compartment recirculating tank.
- Biotube pump vault from Orenco Systems, Inc., Sutherlin, Ore., seated in the second compartment of the recirculating tank.
- Two Orenco 20-square-foot AX20 series AdvanTex secondary treatment units in a fiberglass basin next to the recirculating tank.
- Orenco splitter valve in the riser.
- Orenco high-head 3/4-hp pump with floats to time-dose the disposal field.
- Orenco high-head 1/2-hp pump with floats on a timer to recirculate wastewater in the treatment units.
- Orenco six-zone automatic distributing valve.
- 4,500 feet of 1/2-inch tubing and fittings in six 14-foot wide by 101-foot long zones, and headworks box with filter screen, pressure gauge, and ball valves (Geoflow, Inc., Corte Madera, Calif.).
- VeriComm monitoring system from Orenco controlling the pretreatment unit and drip system.

System operation

Sewage gravity feeds from the septic tanks to the first compartment (1,500 gal-

An Orenco AX-20 secondary treatment unit with lid open.

lons) of the recirculating tank. After passing to the second compartment, the Biotube pump vault transfers the liquid evenly to the two AX-20 units in timed dosages.

As effluent trickles down through and between sheets of textile media, microorganisms growing on it provide treatment. When the effluent reaches a preset level, the recirculating splitter valve sends it to the dosing tank, which pumps it to the disposal field in timed doses.

With each cycle, the automatic distribution valve distributes the effluent to the next zone. The disposal field receives 0.1 gallons per square foot per day.

The subsurface disposal of the effluent occurs in an unsaturated condition, relying on capillary action and evapotranspiration. Any effluent not discharged from the drip tubing is returned by gravity to the first compartment of the recirculating tank, and the process repeats.

Installation

Installer Steve Merklin of Central Jersey Septic in Old Bridge, N. J., first hired a forester to cut down 38 mature maple and oak trees to make room for the tanks and 8,500-square-foot disposal field. After grubbing out stumps up to two feet in diameter with a backhoe and filling the holes with C33 sand, his crew of five removed the two old laterals, crushed and filled the old septic tank, and set the new septic tanks for the main and carriage houses.

"We were wall-to-wall with this system, and Jason had put the tanks where the test pits revealed the deepest shale," he says. "We hit the hardest part of the shale when digging the hole for the carriage house septic tank."

The dosing, recirculating, and treatment units were installed at the system's low point and toward the rear of the property, where the shale was less obtrusive. The crew excavated a trench along the supply side of the drip field to accommodate the piping network. Using a vibratory plow, they started pulling the driplines.

November rains caused delays, since the soil had to be relatively dry before tube installation could continue. Once all the tubes were pulled, they were connected to the supply manifold. Meanwhile, excavation began on the return side of the disposal field and, when completed, the tubing was connected to the return manifold to close the circuit.

Because this was the first advanced treatment system of its kind in New Jersey, three members from the DEP observed constantly. "I had heard all the horror stories about the agency, but these people were great to work with," says Merklin.

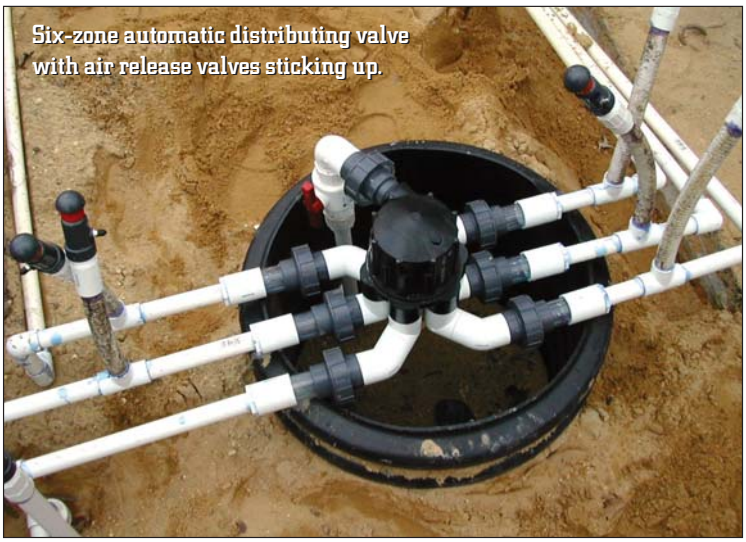
Since this was his first AdvanTex installation, Orenco sent Ted Mott to supervise. "Orenco's support was far more than I ever expected," Merklin says. "I can't speak highly enough of Ted and all he helped accomplish."

Previously, the main house's sump pump and backwash from the water softener discharged into the septic tank. With the Department of Health's approval, Merklin rerouted the discharges into a trench running along the property line. The trench was filled with C33 sand.

The last step was running 200 feet of electric power and phone line from the VeriComm control panel to the house, but Merklin discovered that the phone line from the street to the house wasn't working. The telephone company installed a new line two days later and the control system was activated. Several weeks later, different families moved into the main and carriage houses.

A dosing tank riser with vortex filter, discharge line, and backwash line.

Dosing tank in foreground, recirculating tank in background, AX-20 treatment units to the left in background.



Six-zone automatic distributing valve with air release valves sticking up.

Maintenance

Orenco holds the three-year maintenance agreement and hired a company closer to Lawrenceville to honor it. The agreement calls for semiannual service and Web-based monitoring. The VeriComm control panel troubleshoots the system automatically and makes self-adjustments based on trend data.

Merklin is installing two identical but smaller systems in Colts Neck and Atlantic Highlands, N.J. InSite Engineering designed both of them. ■